

F-16 System Program Office

Fighter of Choice!

Falcon STAR (Structural Augmentation Roadmap)



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Why Falcon STAR?



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- **Operational use exceeds design specs**
- **Result is a shortfall in airframe service life**
- **Requirement identified to restore 8,000 hours total service life**
- **Result: \$1B Falcon STAR mod program initiated to replace/rework known life-limited structural components to preclude the onset of widespread fatigue damage, maintain safety of flight, enhance aircraft availability and reduce maintenance inspection requirements**



Participants



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- **USAF - Active duty, ANG, AFR**
- **EPAF - Belgium, Denmark, Netherlands, Norway, and Portugal**
- **FMS - Israel, Greece, Singapore, Thailand, and Bahrain**

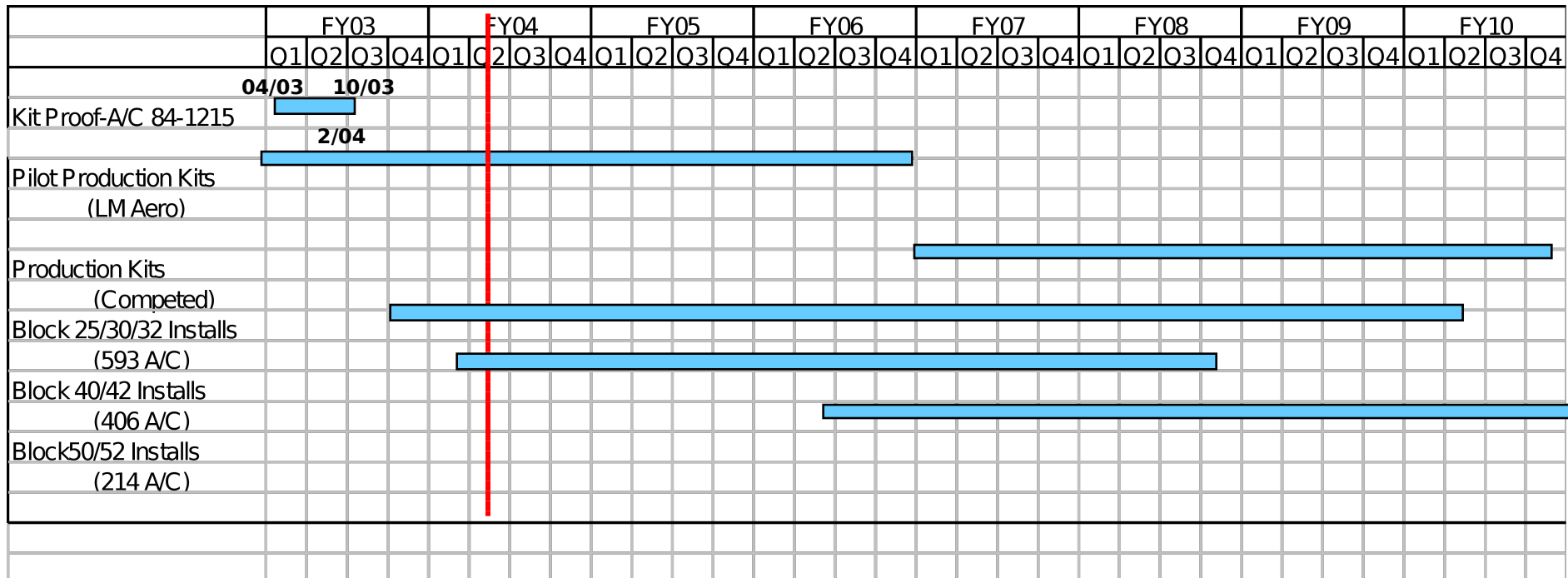


Program Schedule



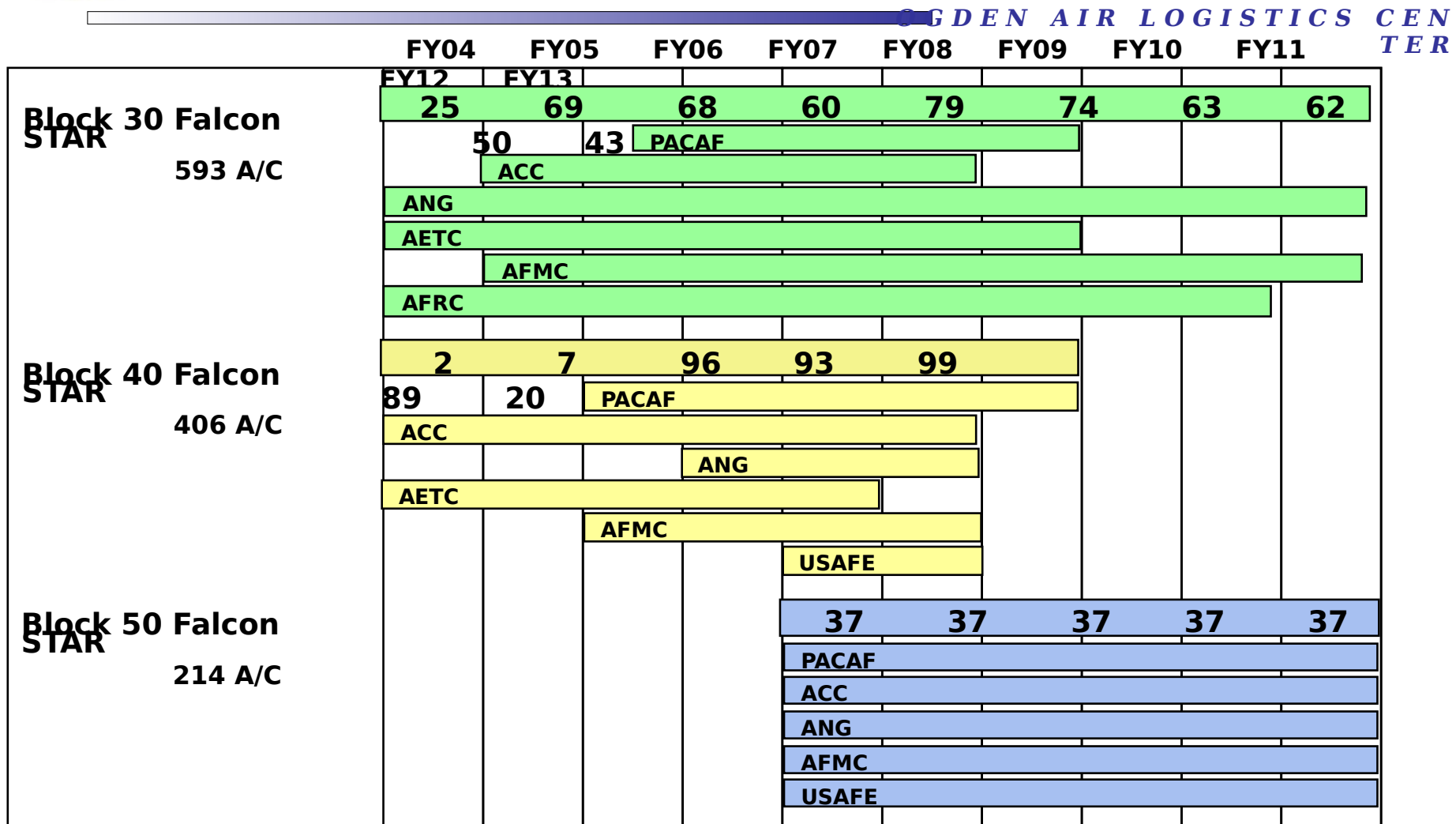
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USAF Schedule





Program Schedule

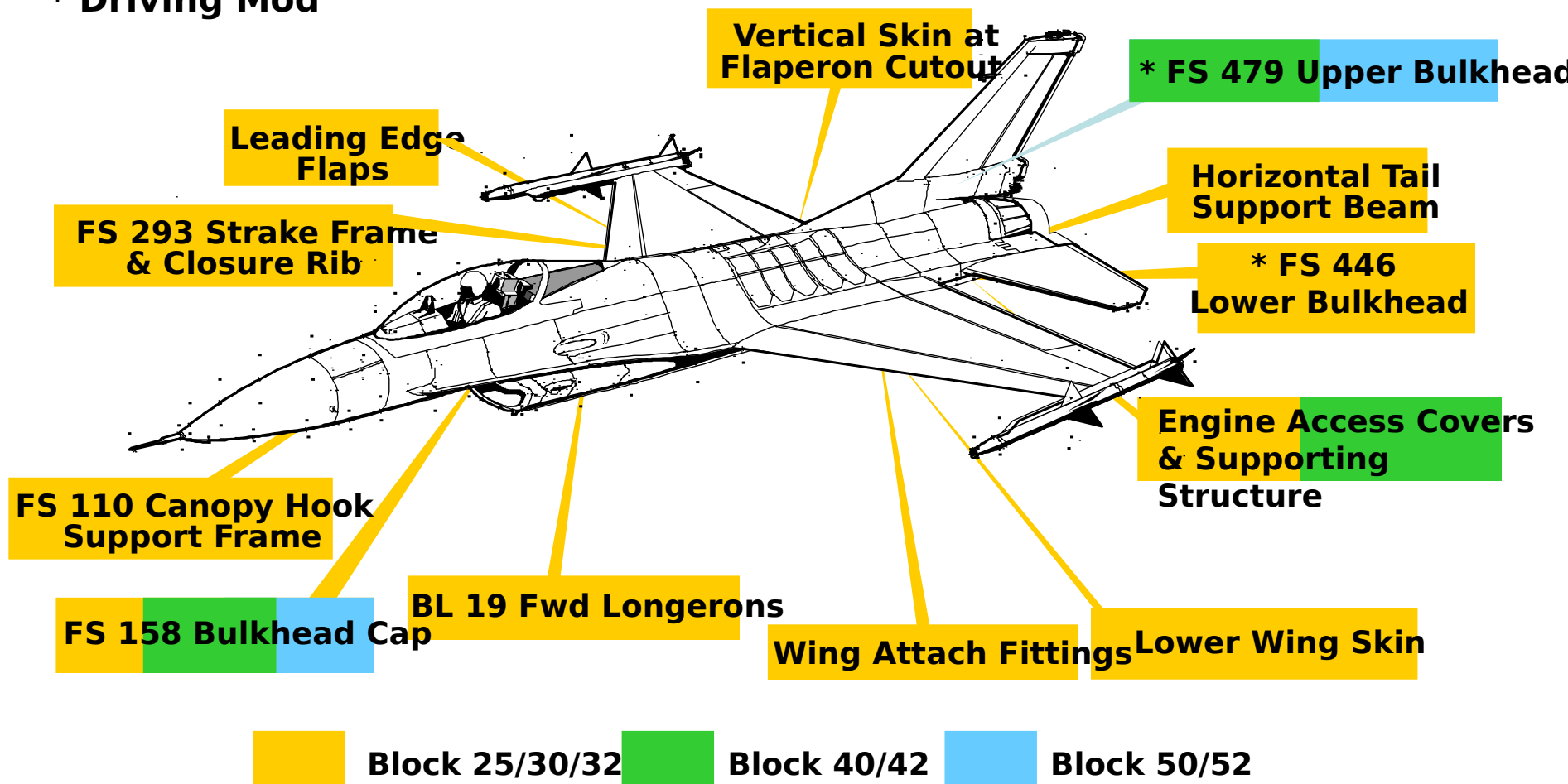




Structural Enhancements

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* Driving Mod

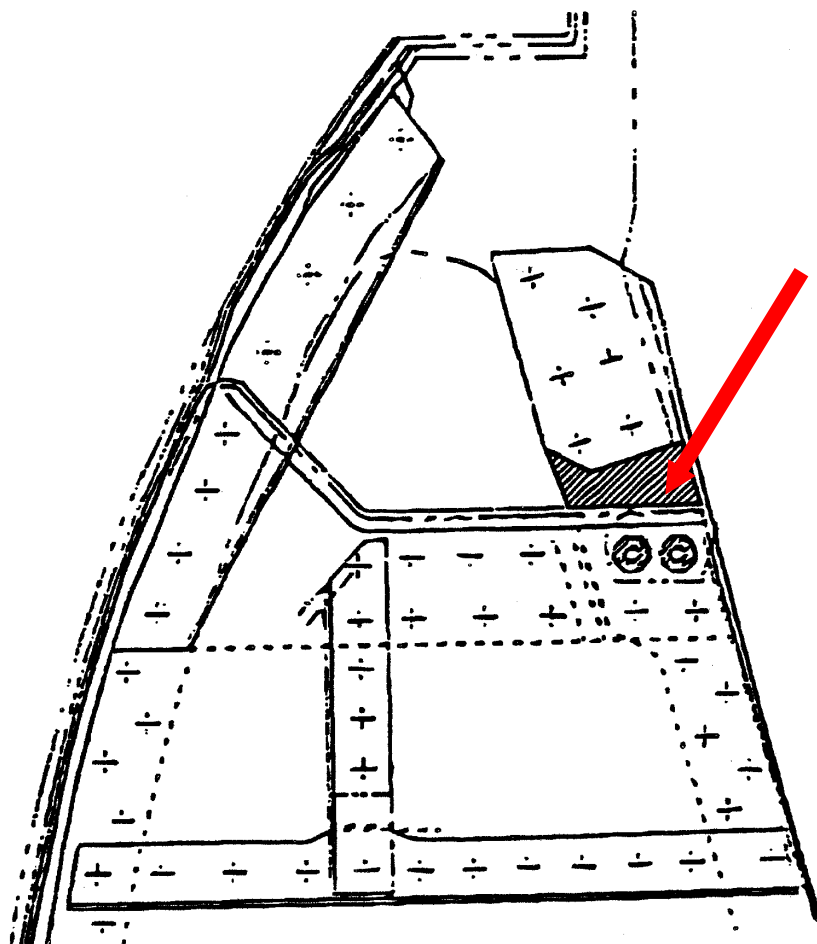




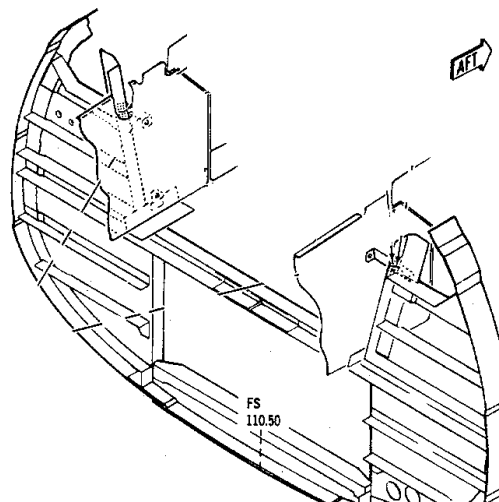
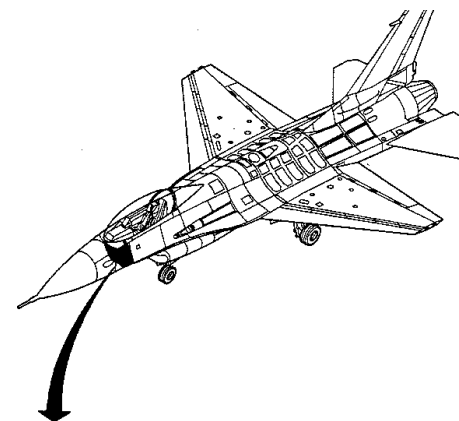
FS 110 Canopy Hook Support Existing Design



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Cracking

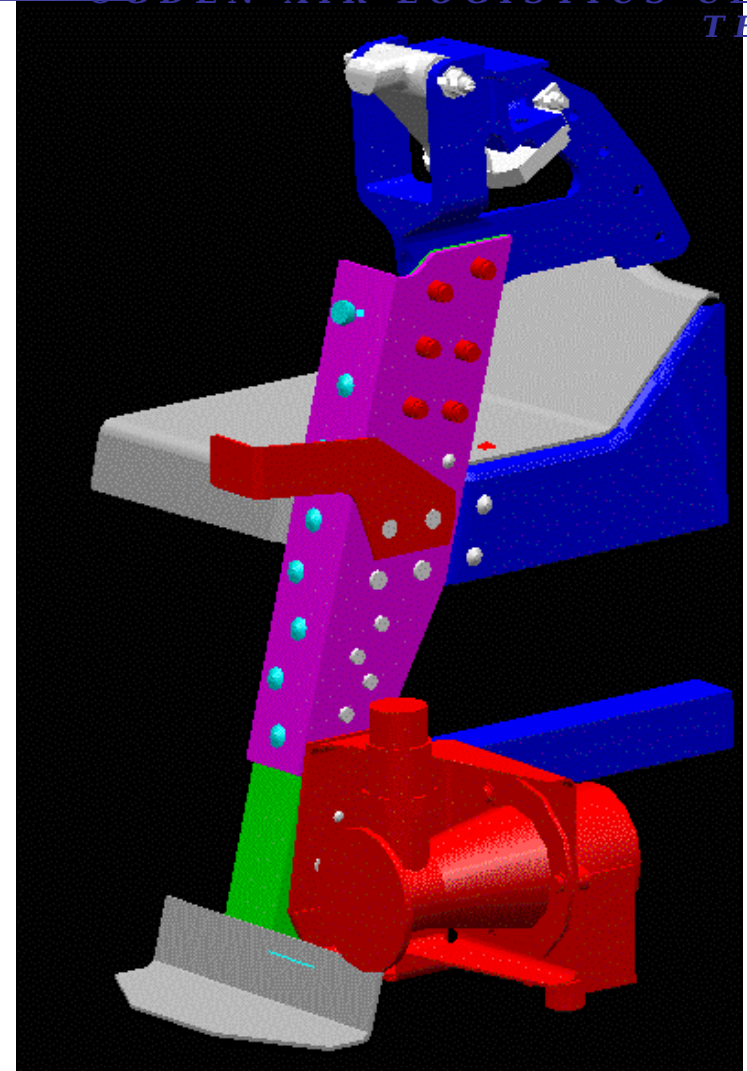




FS 110 Canopy Hook Support Improved Design



- Improved Design Over Repair Drawing
 - Unitized Structural Reinforcement Angle
 - Reduced Part Count
 - Eliminated 3 Tapered Spacers and 3 Shims
 - Reduced Installation Cost
 - Released as Catia Dataset
 - Changed Fastener Type to Facilitate Installation
 - Addressed Systems Impacts





FS 158 Bulkhead Cap Existing Design



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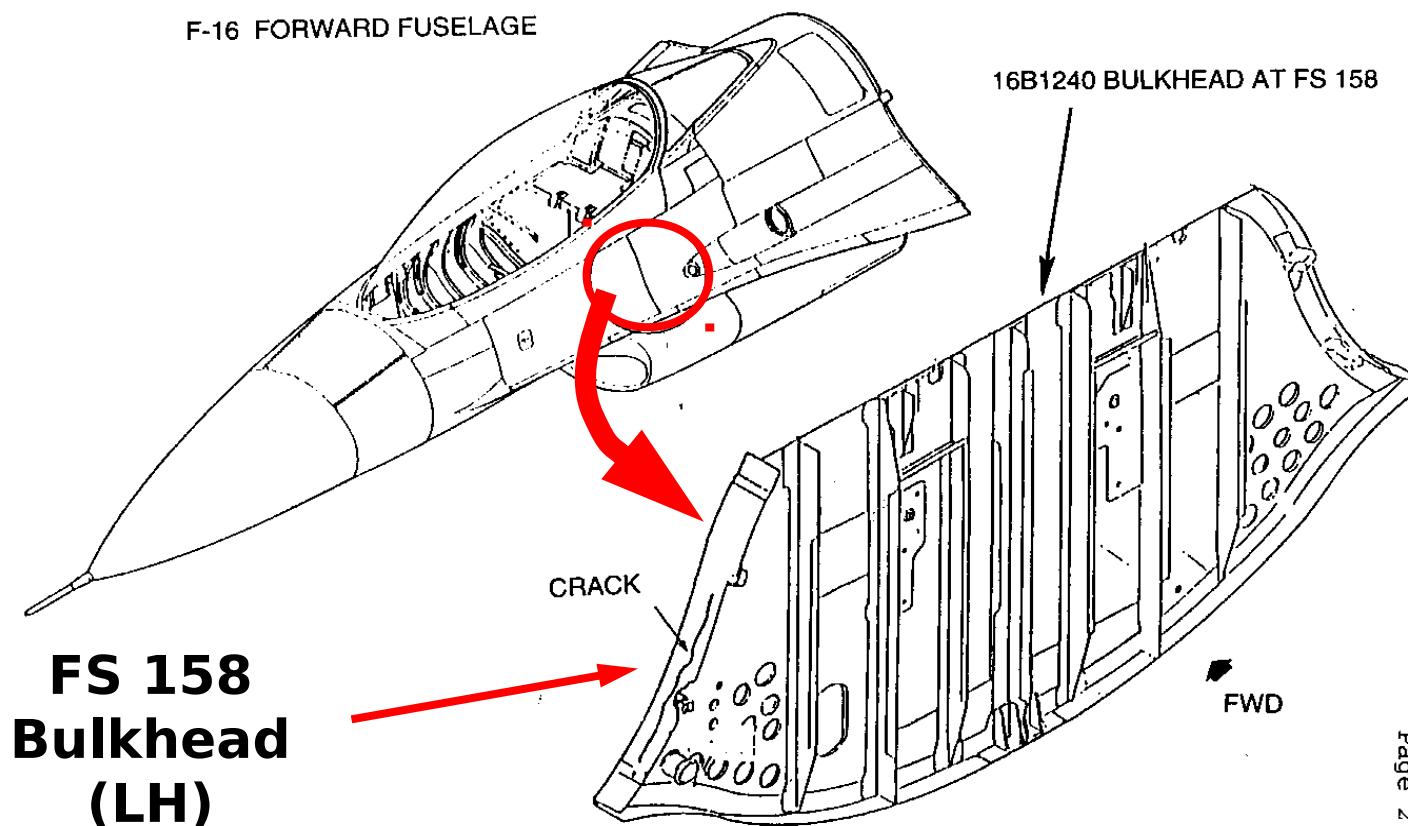


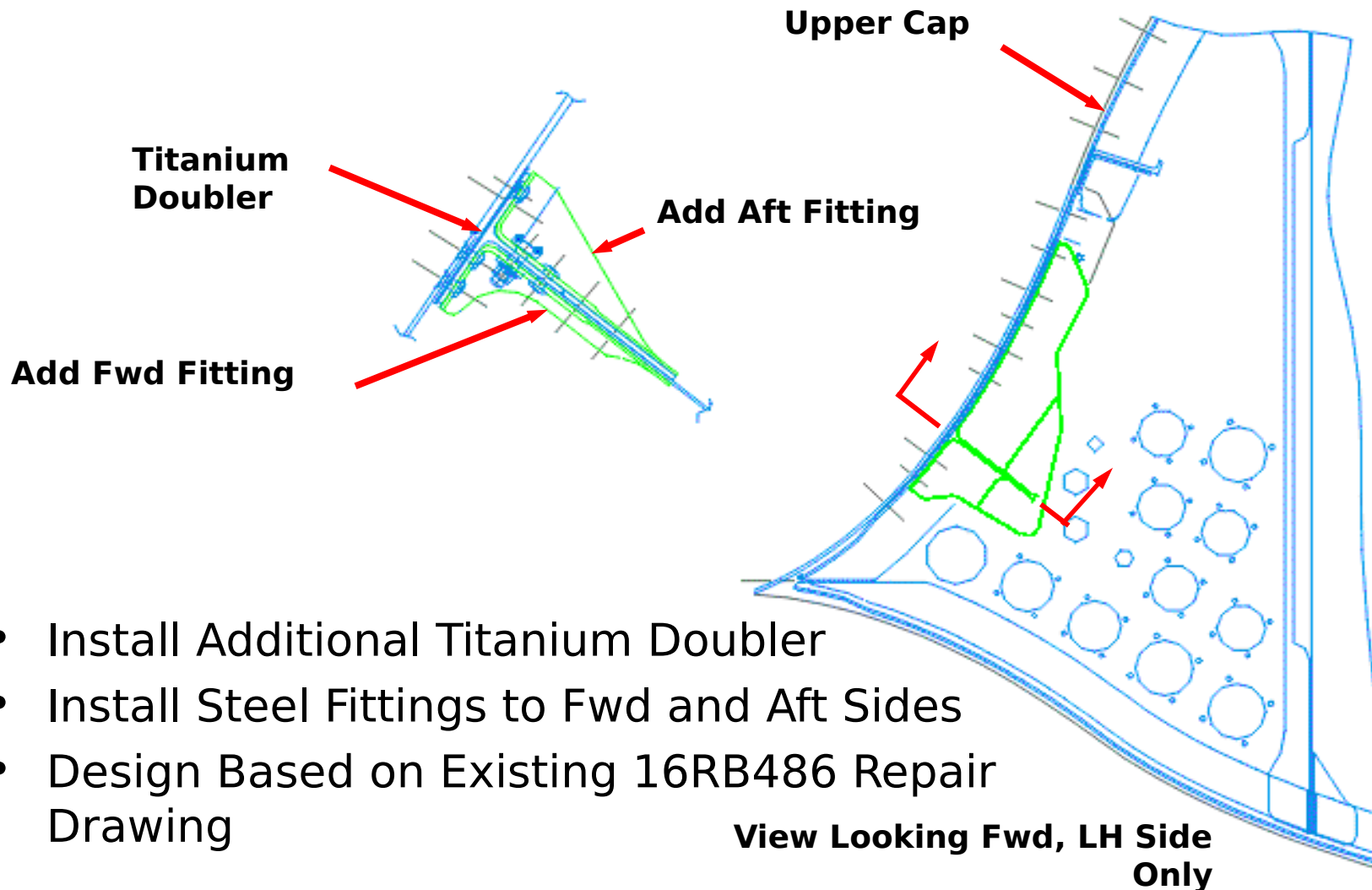
FIGURE 1.0-1 CRACK LOCATION IN 16B1240 BULKHEAD AT FS 158



FS 158 Bulkhead Cap Improved Design



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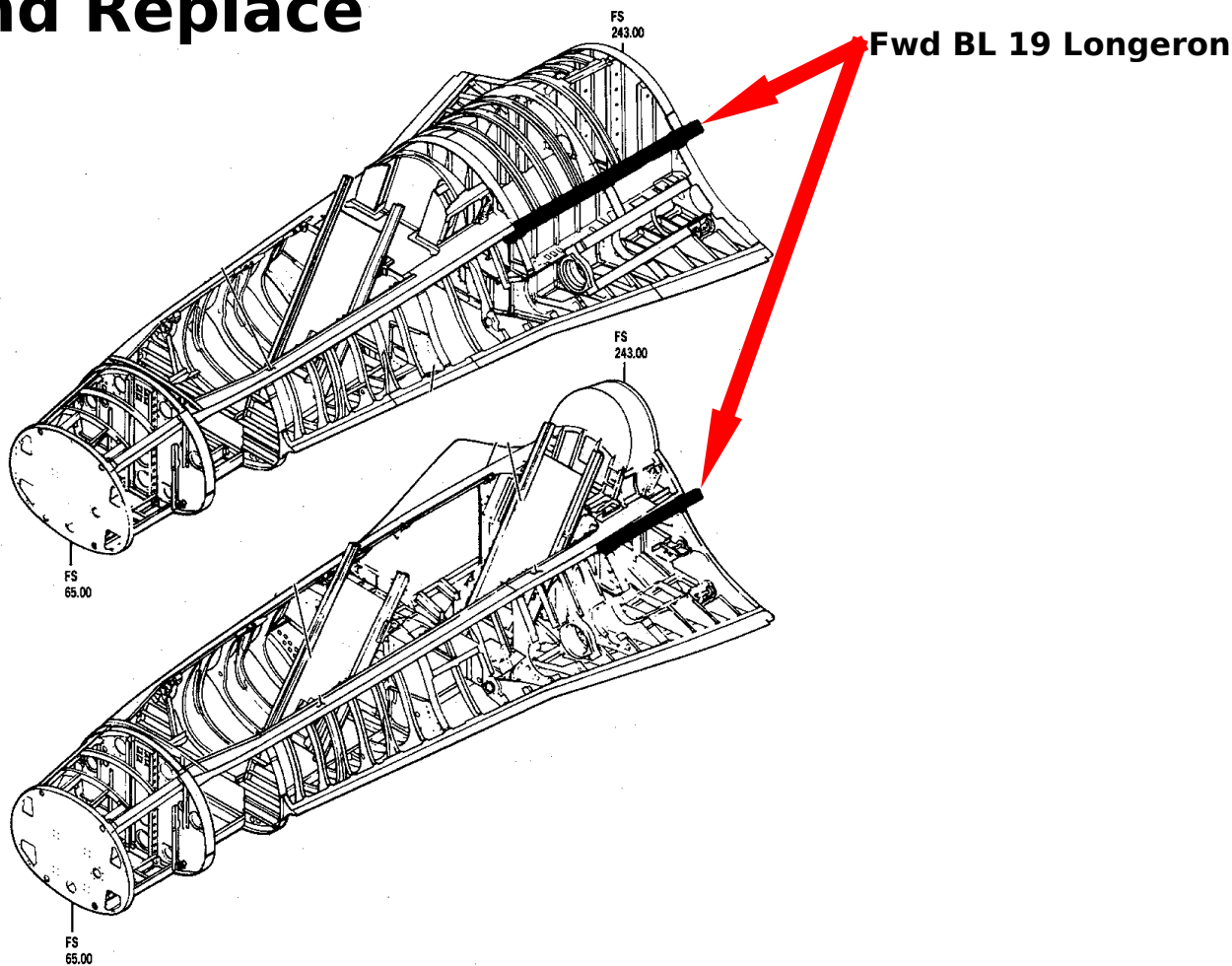


Forward BL 19 Longerons



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- **Remove and Replace**

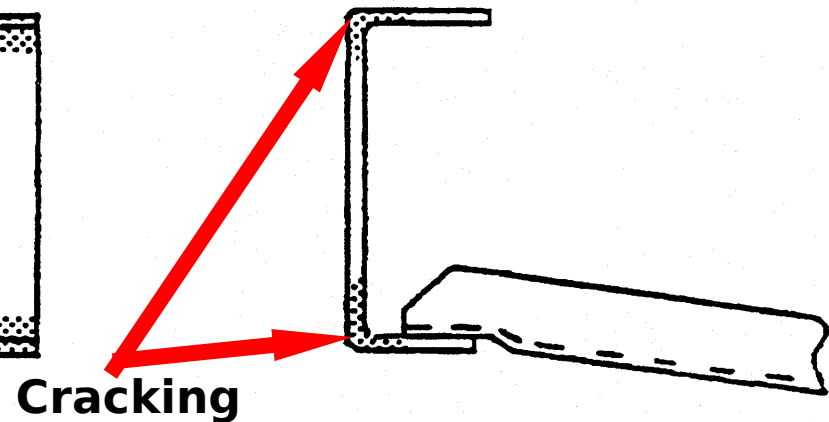
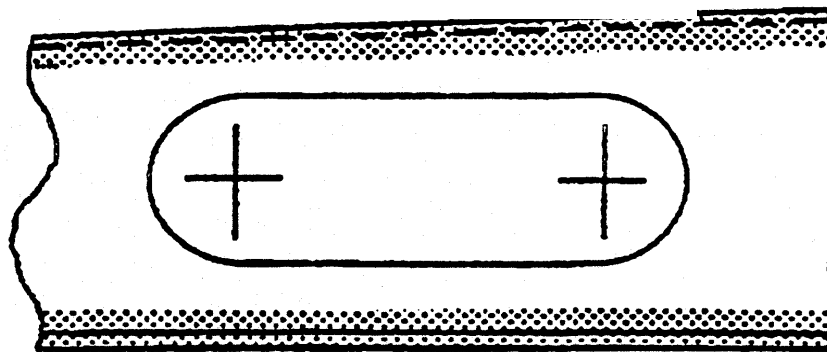
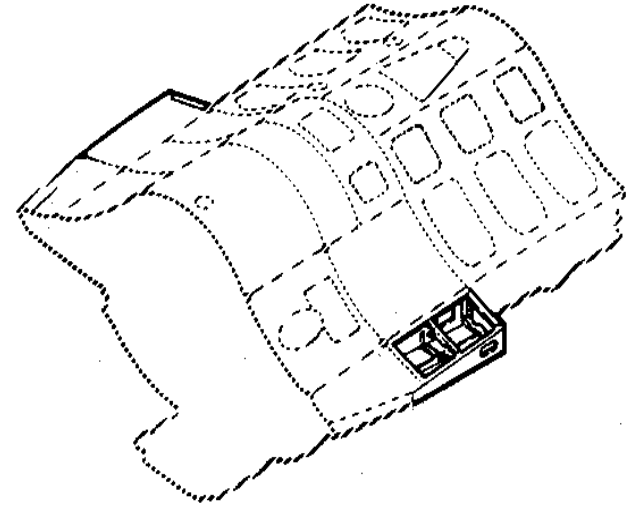
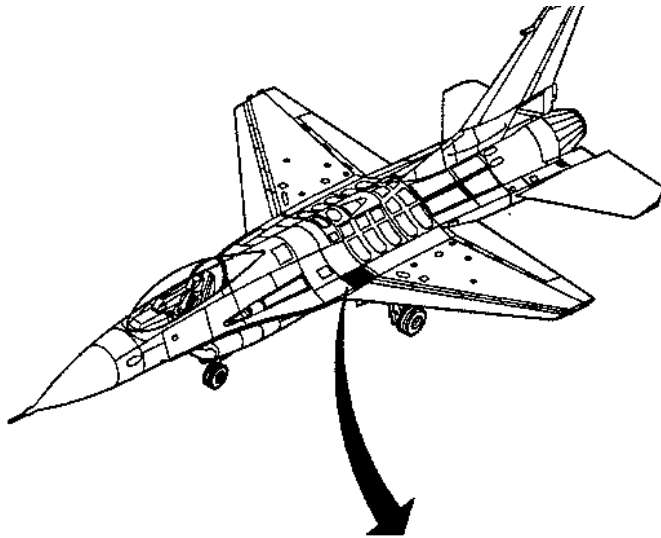




F-293 Strake Frame/Closure Rib Existing Design



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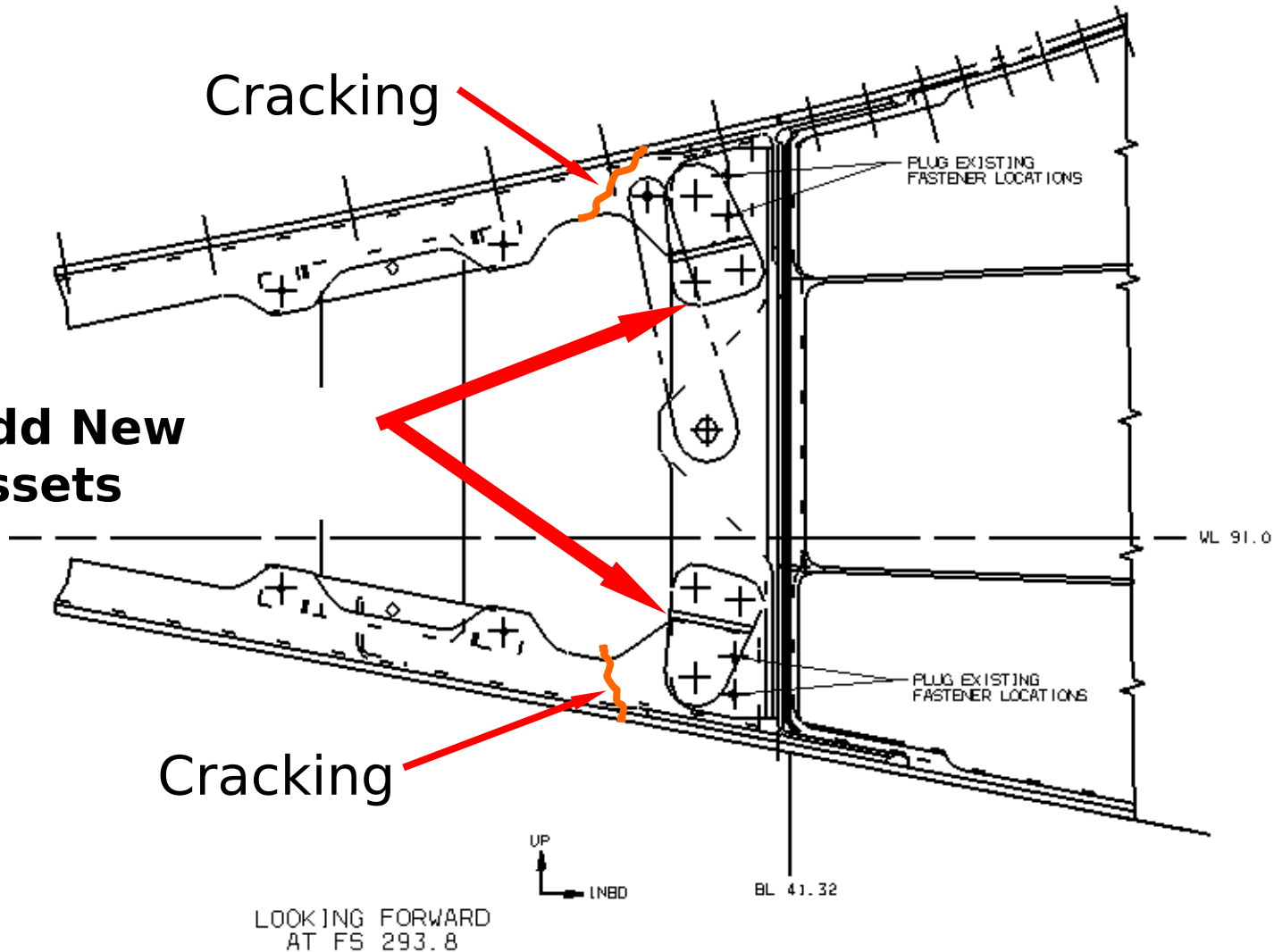


FS 293 Strake Frame/Closure Rib Improved Design



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- Add New Gussets

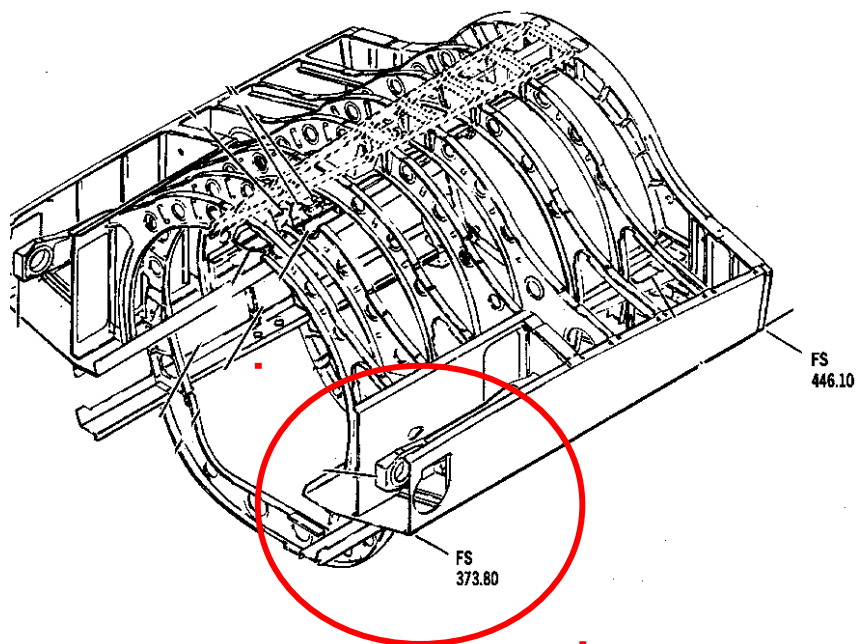




Vertical Skin at Flaperon Cutout Existing Design



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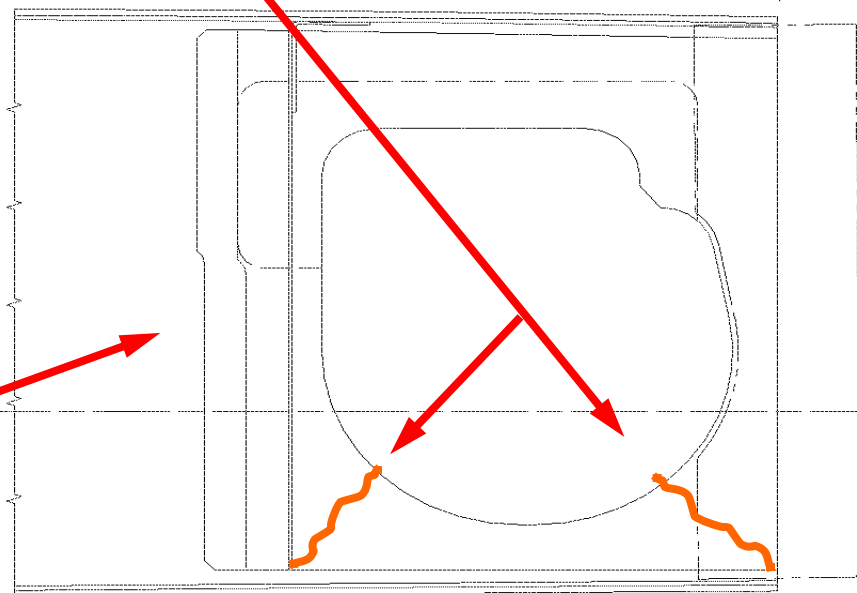


Cracking

FS 389.8

FS 373.8

**16B6307
Skin**



View Looking Outboard

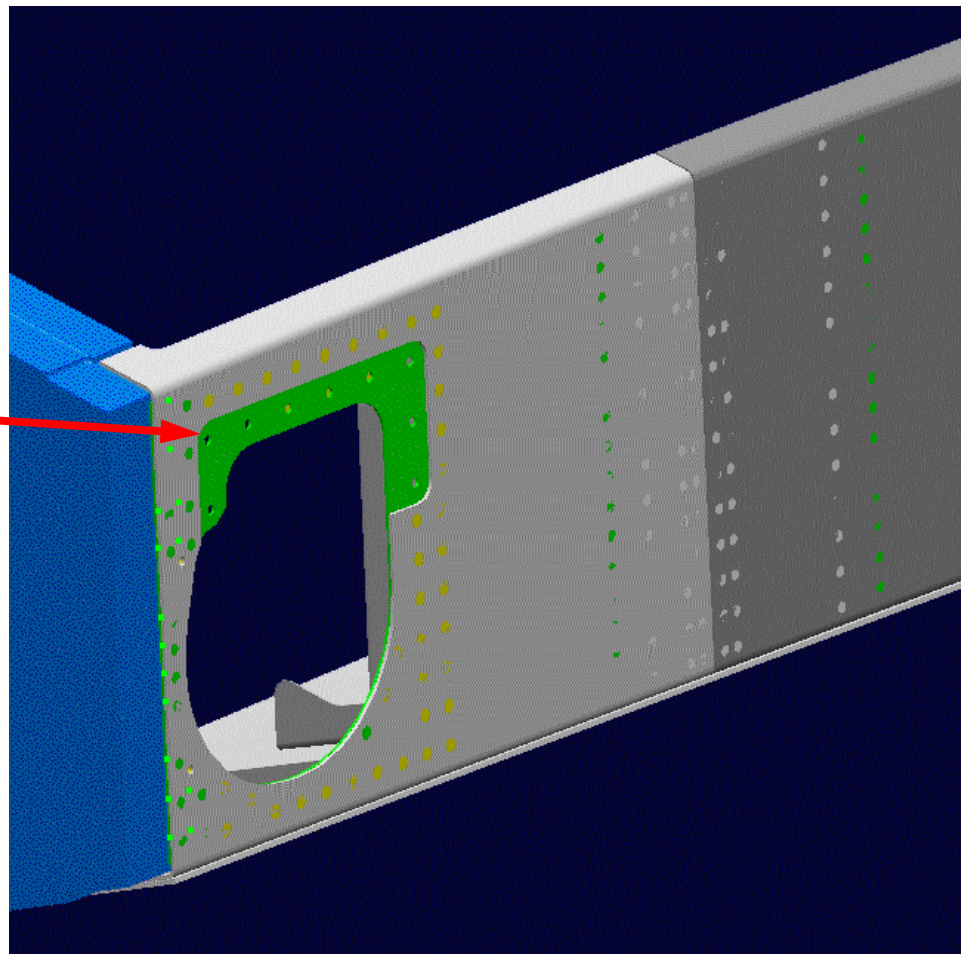
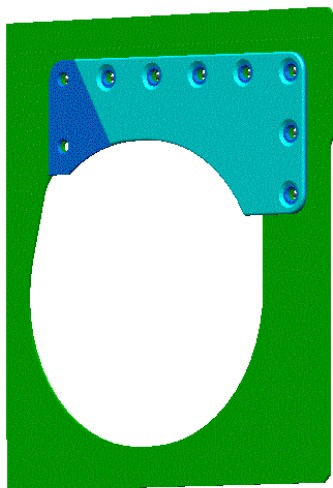


Vertical Skin Flaperon Cutout Improved Design



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- **Install Titanium Doubler**



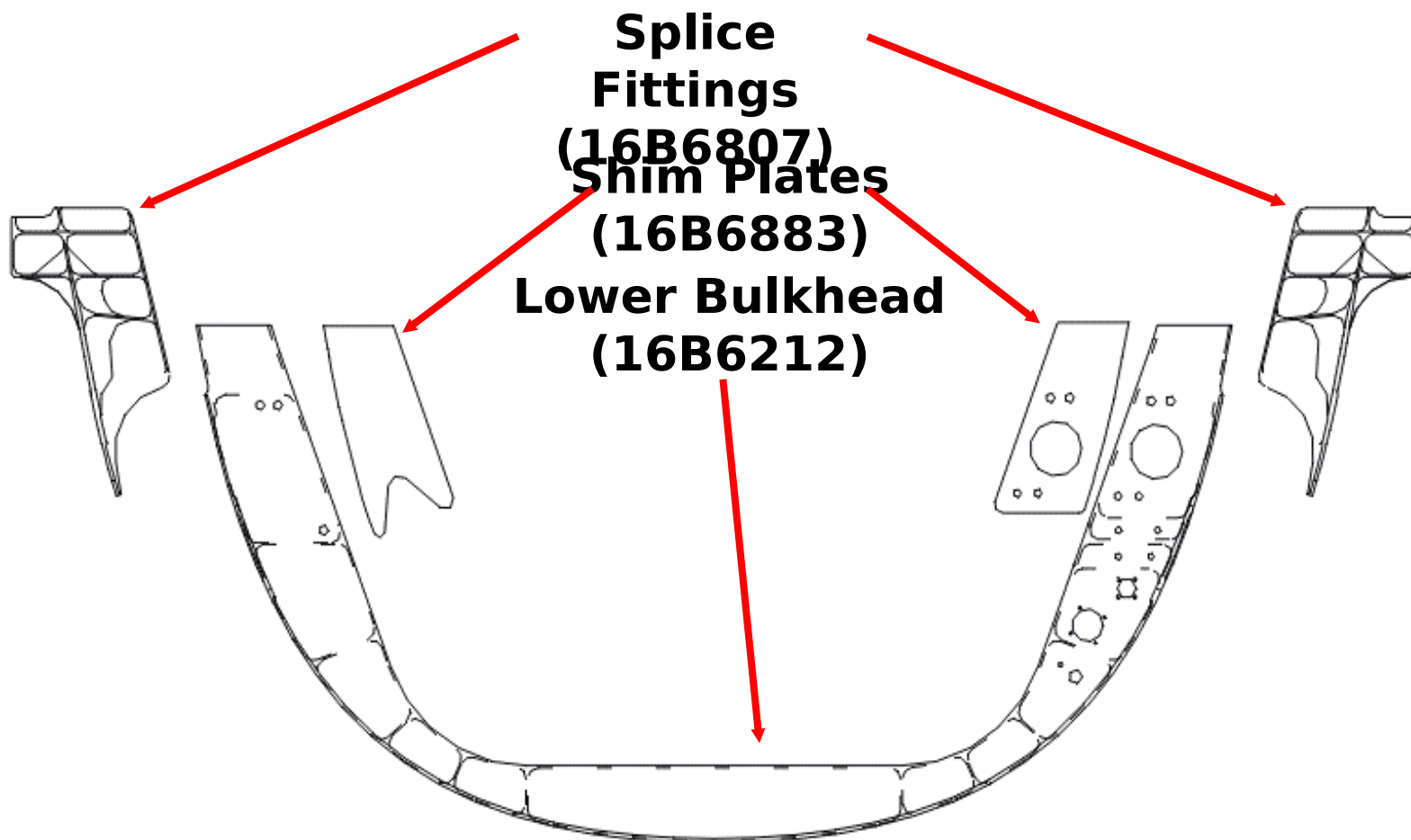


FS 446 Lower Bulkhead Existing Design



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Five Piece Structural Assembly

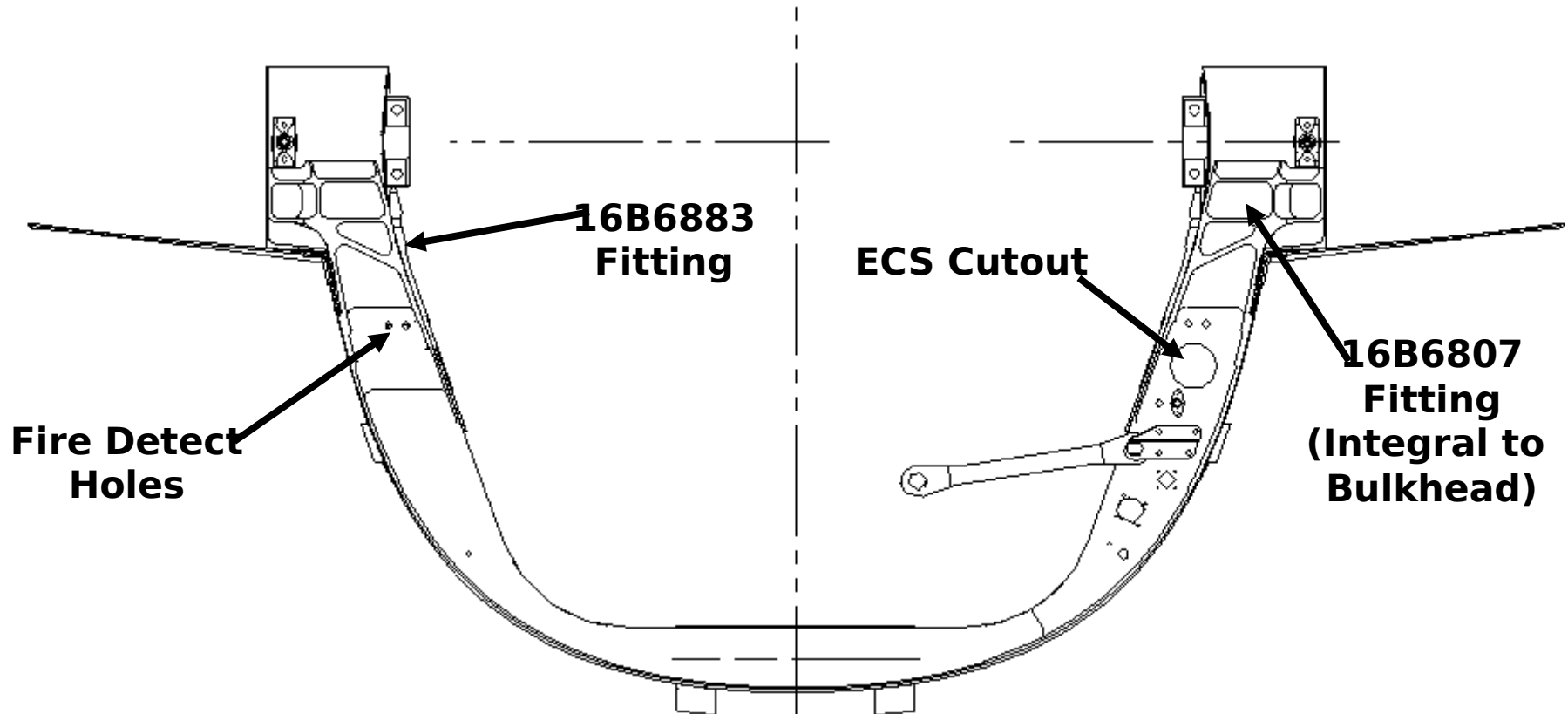




FS 446 Lower Bulkhead Improved Design



- Use of Al-Li material for improved crack growth characteristics
- Thickened webs and flanges
- Incorporation of 16B6807 fitting into parent bulkhead
- Use of Al-Li material for 16B6883 fitting

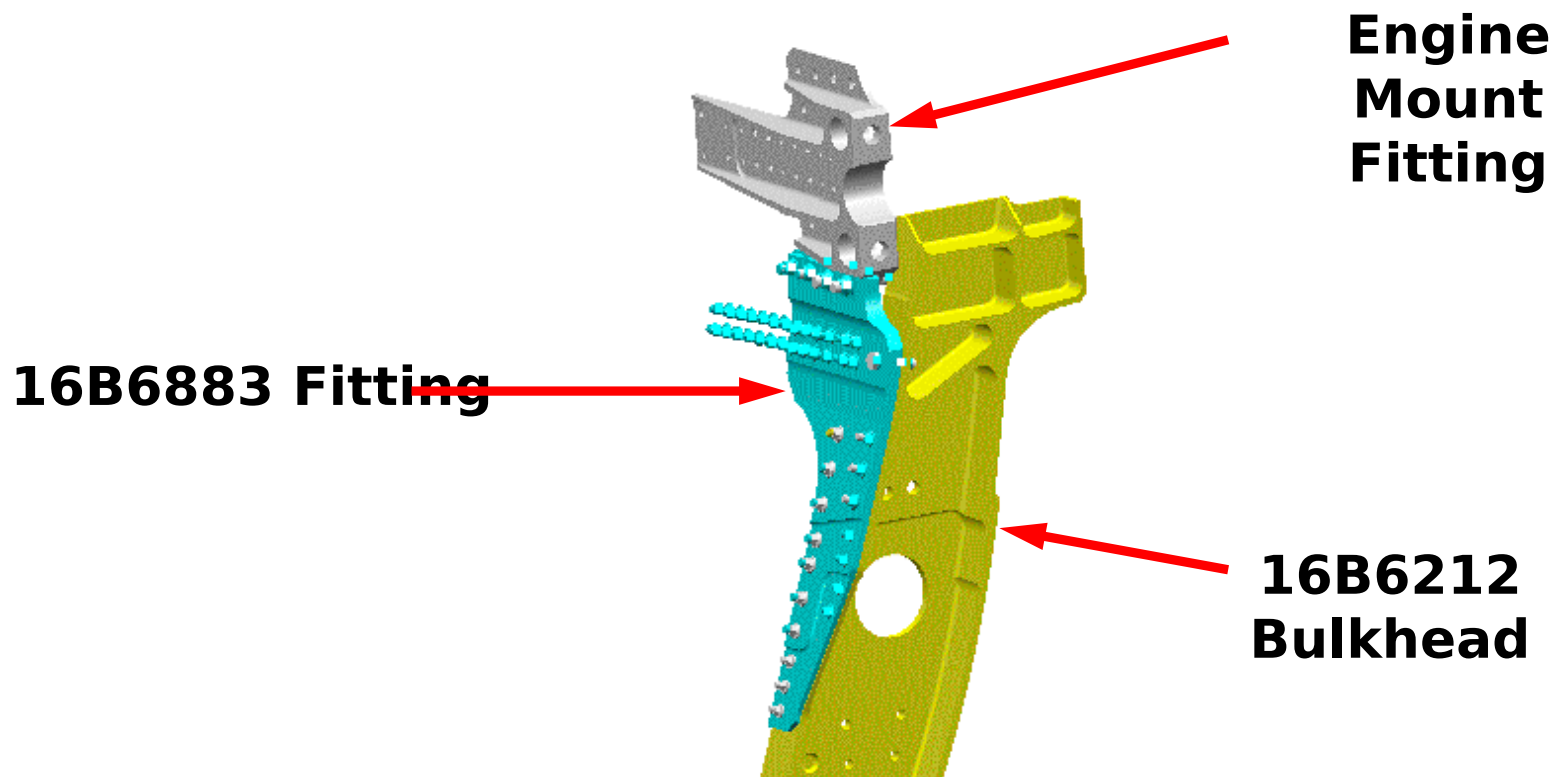




FS 446 Lower Bulkhead Improved Design (cont)



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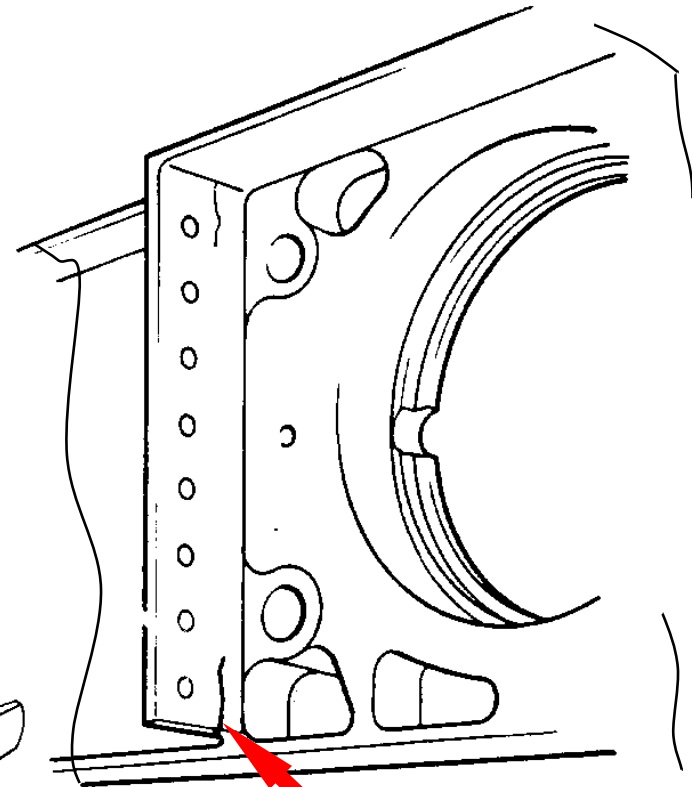
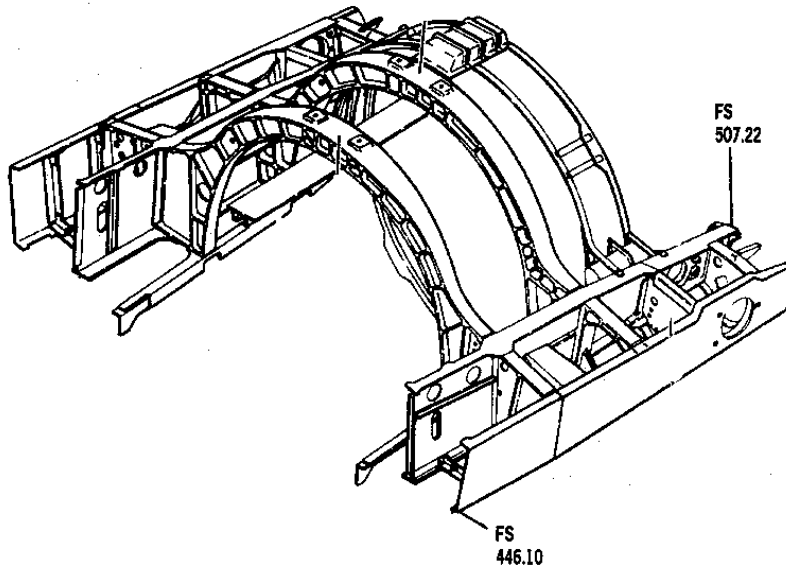
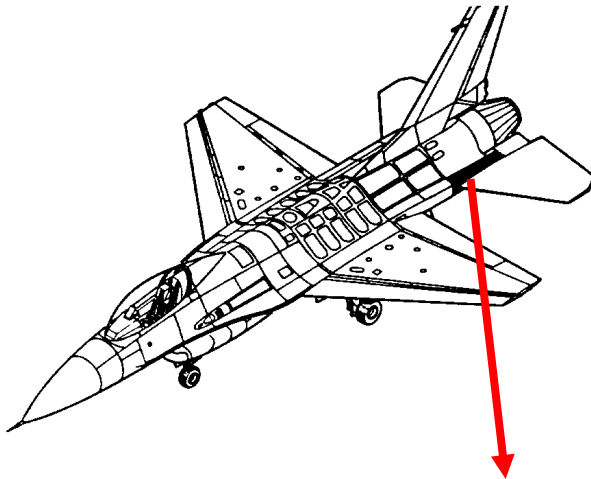
View Looking FWD, RH Side



Horizontal Tail Support Beam Existing Design



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Cracking

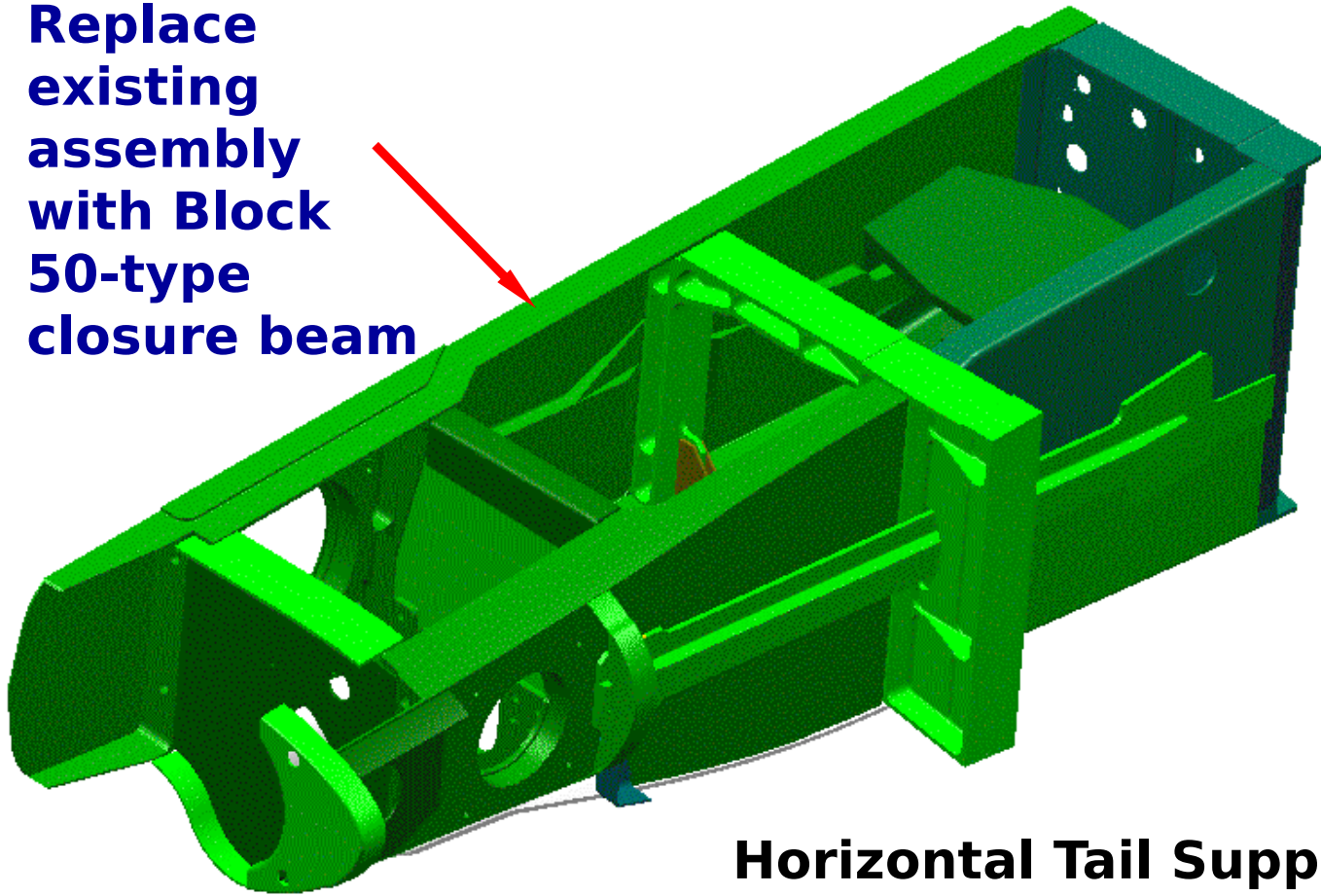


Horizontal Tail Support Beam Improved Design



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- **Replace existing assembly with Block 50-type closure beam**



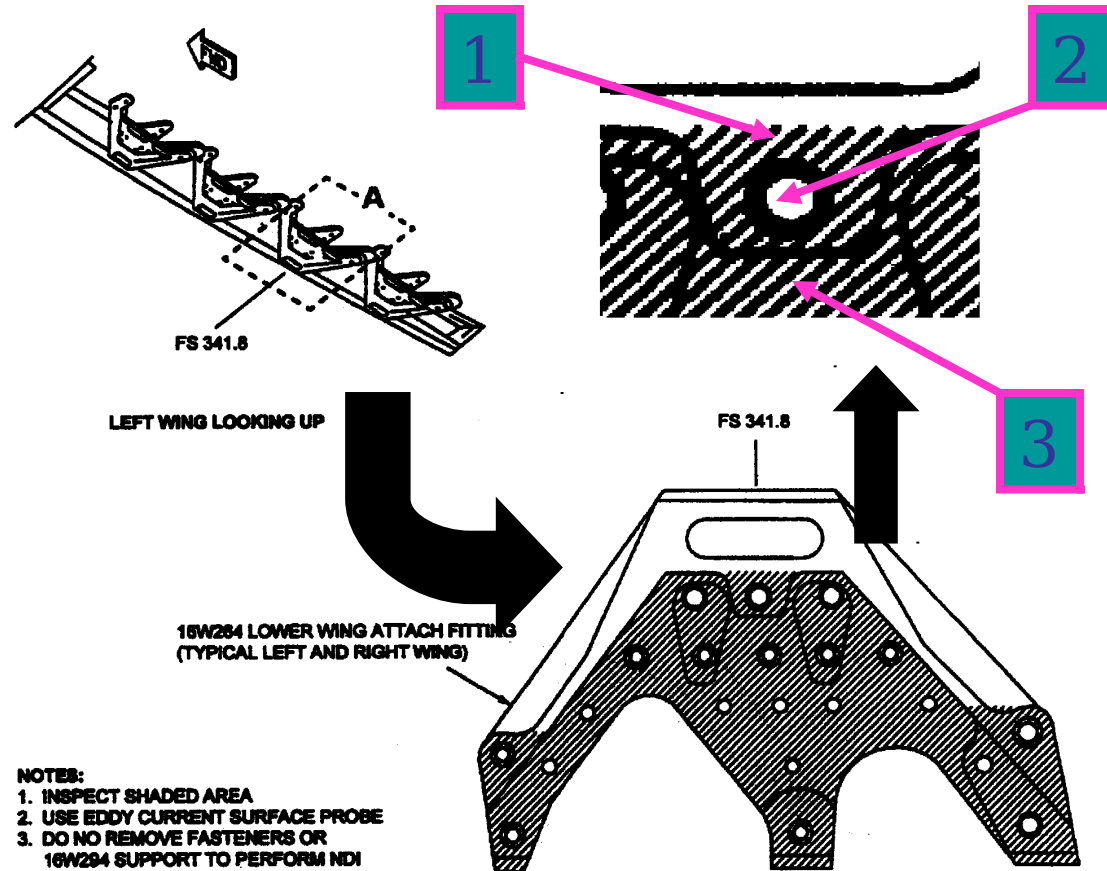
**Horizontal Tail Support
Structure LH Side**



Wing Attach Fittings Existing Design



- Cracking found primarily in marked areas (1 - 3)
- Instances of multiple cracked fittings on a single aircraft and multiple cracks on a single fitting

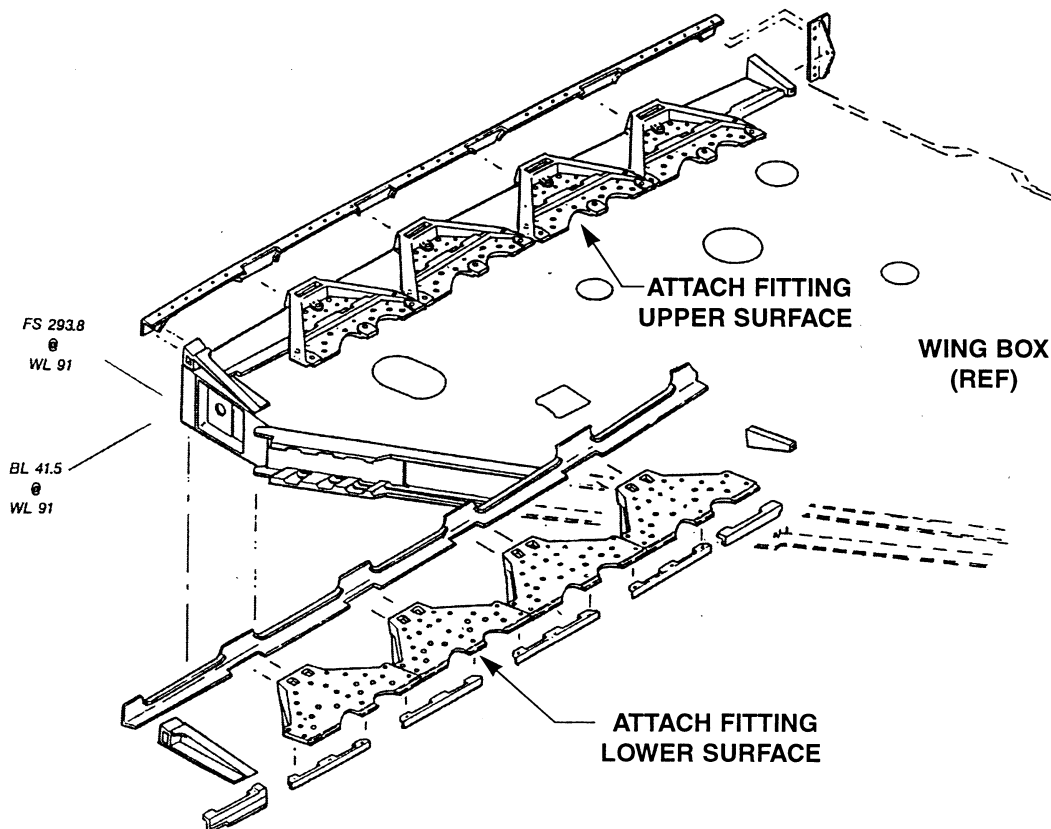




Wing Attach Fittings Improved Design



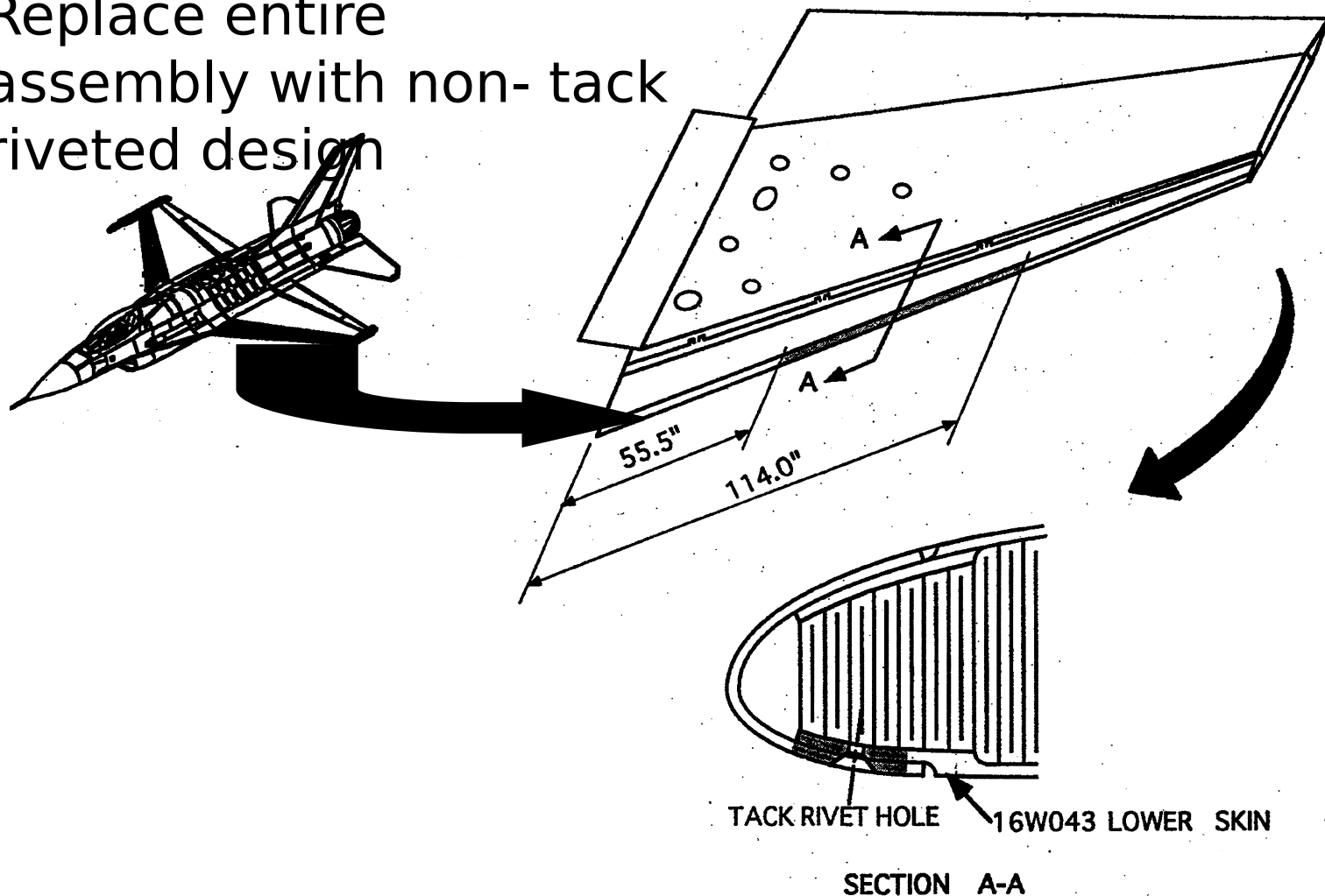
- Replace all upper and lower wing attach fittings
- Material change to Al-Li (2297) on lower fittings only





Leading Edge Flaps

- Replace entire assembly with non-tack riveted design

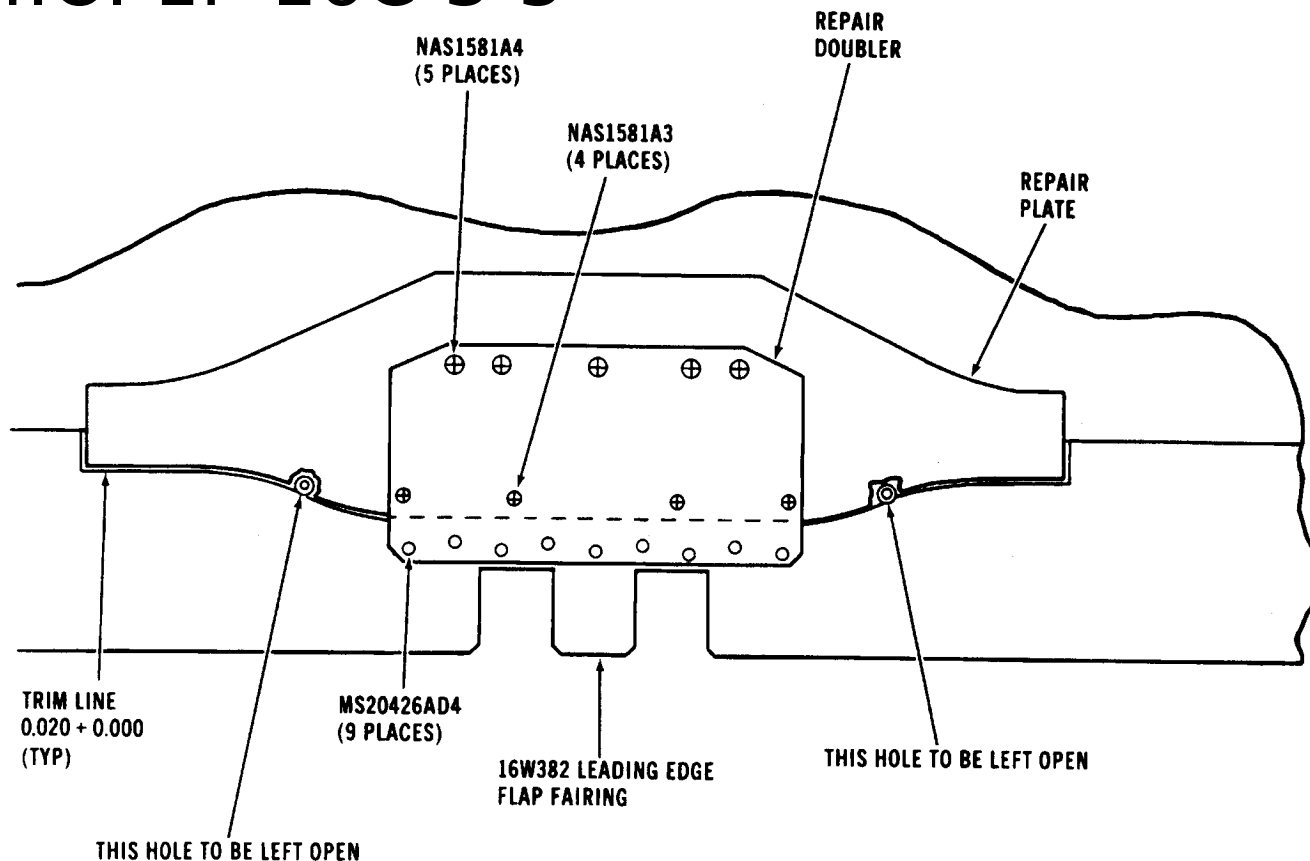




Lower Wing Skin SPAR



- Retrofit with doubler similar to repair in T.O. 1F-16C-3-5



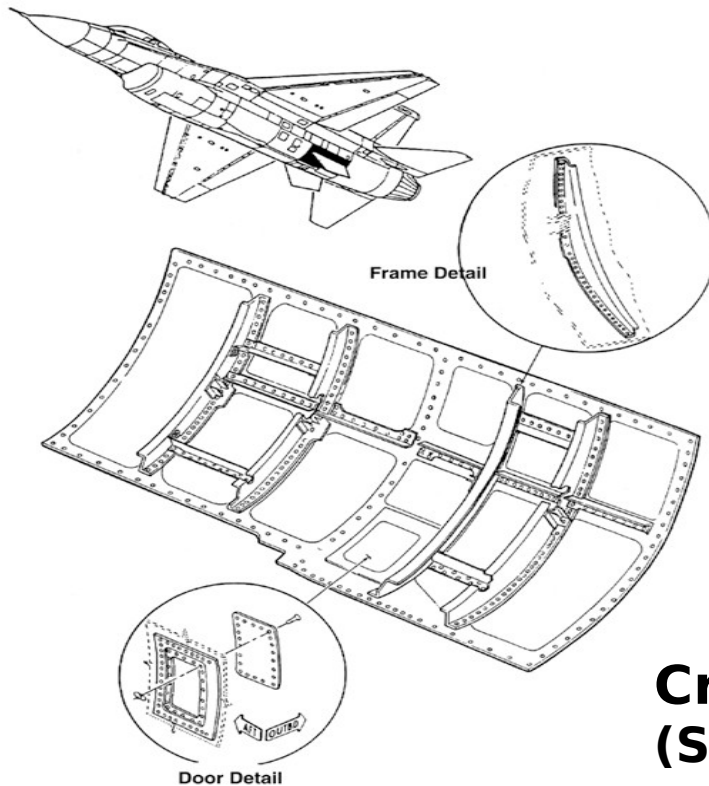


Engine Access Cover Early Block 25

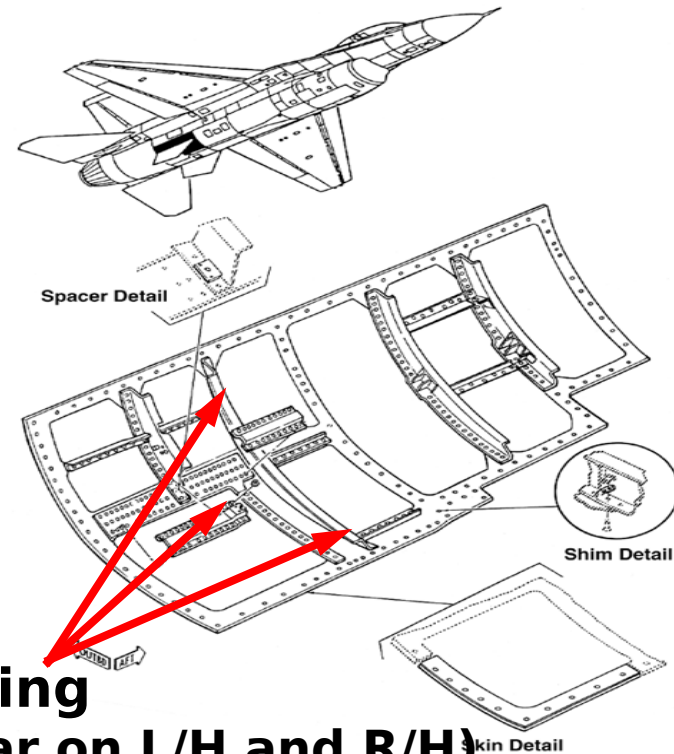


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16B6530-847 ENGINE ACCESS COVER L/H



16B6530-848 ENGINE ACCESS COVER R/H



**Cracking
(Similar on L/H and R/H)**

- Replace with new cover similar to later Block 25 and Block 30-42 covers

G10993
30 November 1999

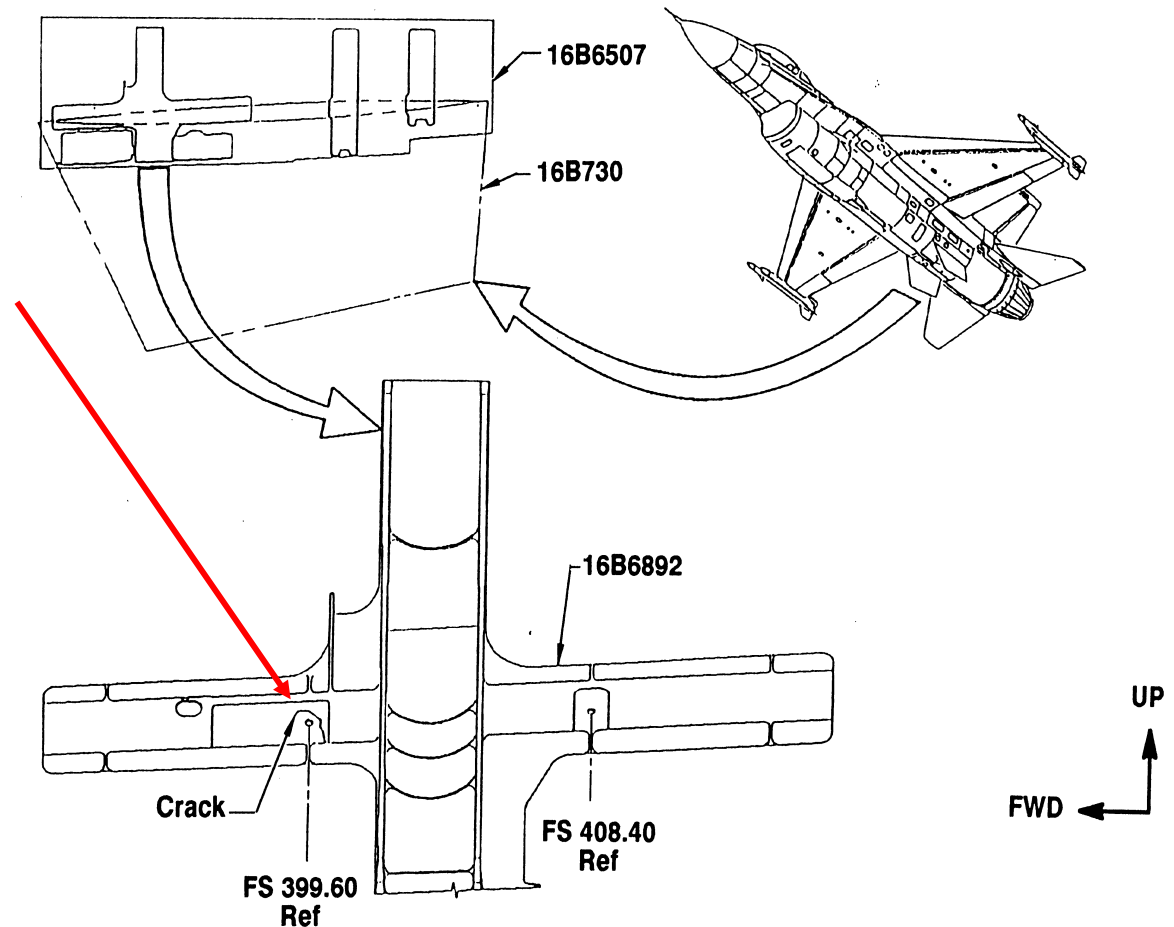


Engine Access Cover Later Block 25/30/32/40/42



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- Stiffener cracks R/H side at forward attach bolt hole
- Incorporate improved stiffener similar to ECP 2088 design
 - Geometry changes
 - Increased thickness
 - Material change to Al-Li
 - Attach point improvements



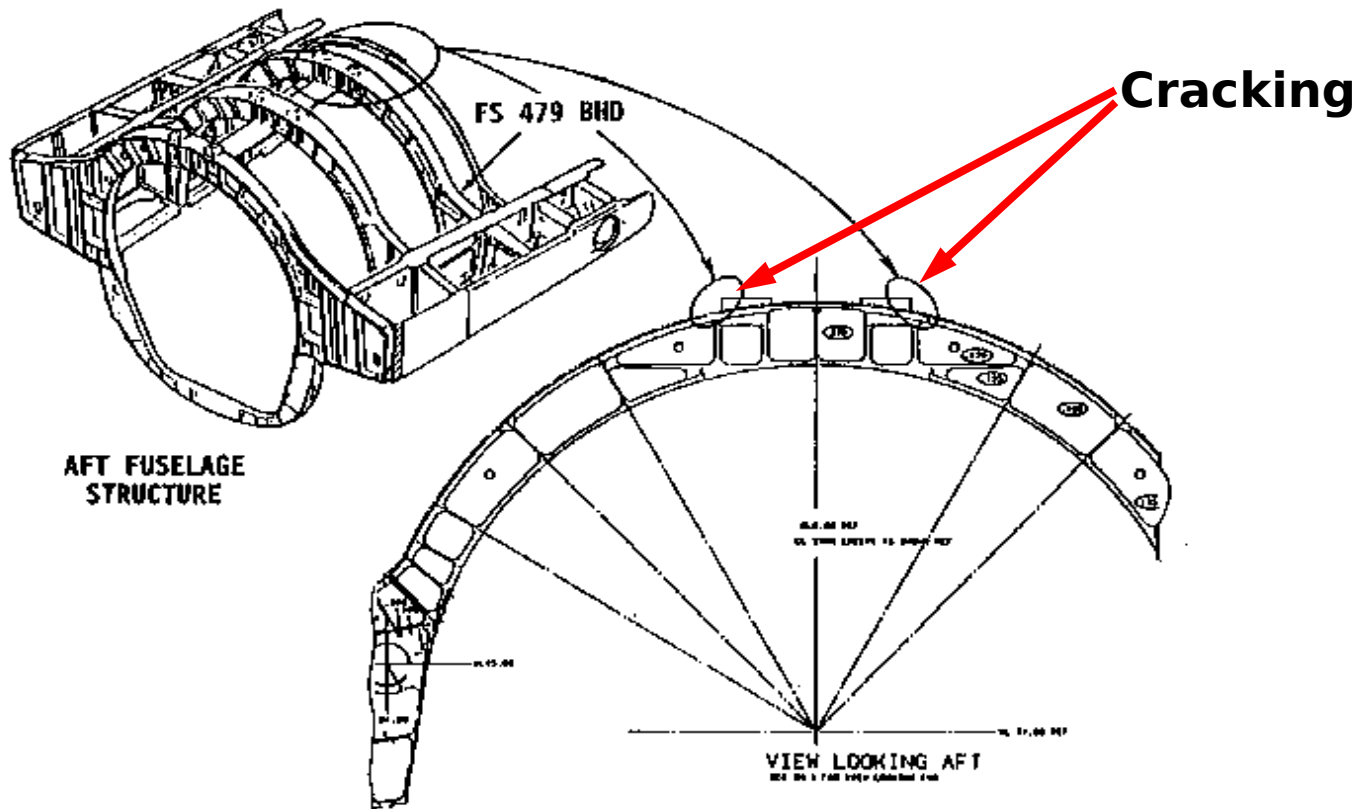


FS 479 Upper Bulkhead Existing Design



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16B6224 S 479 BHD, Vertical Tail Attach Pad



ACA1257



POC's



OGDEN AIR LOGISTICS CENTER

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- **Falcon STAR Lead Engineer**

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Summary

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- **USAF F-16s will not reach 8,000 hours without structural modifications**
- **Falcon STAR addresses known structural deficiencies and restores 8,000 hour service life**
- **USAF/EPAF EMD and Pilot Production sole-sourced to LM Aero**
- **Remaining USAF/EPAF/FMS production kits to be contracted for delivery beginning in FY06**